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JOURNAL OF BIOSCIENCES – AN ANALYSIS OF CITATION PATTERN

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ABSTRACT

The study is based on 1049 citations appended to 34 research articles pertaining to issue nos. 2 to 4 of volume 20 of *Journal of Biosciences* of the year 2000. The authorship pattern of the citations shows that 18.68% per cent papers are single-authored, 52.71 per cent are double- and triple-authored, and the remaining 28.61 per cent are joint contributions of four or more authors. As in the case of medicine, the team size of this field is also bigger than those in the fields of chemistry and physics. As many as 25 articles of mega-authorship (i.e. contributions by ten or more authors) have been encountered in this study, and one of them was by 22 authors. Of the citations, journal articles comprised 85.89 per cent, and monographs 10.1 per cent. Indian contributions comprised 5.53 per cent of the citations. Of the citing articles 30 are by Indian authors, 3 by foreign authors, and 1 (2.94%) jointly by Indian and foreign authors. Of the total citations 10.87 per cent are author self citations and 0.57 per cent are journal self citations.

KEYWORDS - *Journal of Biosciences*; Citation analysis; Biosciences; Biology; Botany; Zoology; Scientometrics.

INTRODUCTION

In this paper, we are taking the meaning of biosciences in a bit restricted sense signifying thereby the inclusion of biology, botany and zoology and exclusion of medicine and agriculture inasmuch as the production of literature in medicine and agriculture is so vast that they justify separate treatment.

Unlike mathematics, physics and chemistry, where systematic research in modern times started in India in the last quarter of the eighteenth century [1 - 3], research in biosciences, particularly botany started much earlier. Garcia da Orta, a Portuguese physician and botanist, reached Goa in 1534 and stayed there till his death in 1570. During his stay in Goa, he established a botanic garden to nurse among others the medicinal plants, studied scientifically the flora of the region and published the book *Colloquies dos Simples e Drogas de Cousas Medicinais da India*. The book printed in 1565 describes local plants and fruits. Another outstanding figure, who will always be remembered for his brilliant piece of work on Indian flora is Heinrich van Rheede tot Drakenstein, the Governor of Dutch Possessions in India. His magnum opus called *Hortus Malabaricus* completed in twelve volumes and published during 1686 – 1703 from Amsterdam, described numerous plants of the region in most systematic manner. He seems to be one of the firsts to get illustrations of a number of plants drawn for his book. The number of plates included in his book totals 794. It is worth mentioning that Karl Linnaeus, the founding father of taxonomic botany, used the aforementioned book for providing the nomenclature of Indian plants which he included in his *Species Plantarum*. The study of Indian plants which was ushered in by da Orta continued with of course some breaks here and there till the last phase of the eighteenth century when the establishment of the Royal Botanic Garden at Sibpur in 1787 provided the necessary boost for botanical research in India [4].

Zoological studies, however, lagged behind and did not pick up the momentum till the first quarter of the nineteenth century. However, the very first volume of *Asiatick Researches (AR)* published in 1788 contained one paper by Mathew Leslie on the pangolin of Bahar. Surprisingly, the very second volume of *AR* published in 1790 included the paper entitled 'On the Baya, or Indian Gross-Beak' by At'har Ali Khan. In all probability this is the first paper by an Indian on zoology [5].

For reasons beyond us, Indian works on biosciences have not been that outstanding as in the case of physics. Leaving aside the fields of medicine and agriculture, we find only three Indian FRSs belonging to the field of biosciences out of a total of thirty-eight. The FRSs pertaining to this field are: Birbal Sahani (Palaeobotanist) (FRS – 1936); P Maheshwari (Botanist) (FRS – 1965); and Obaid Siddiqui (Molecular Biologist) (FRS – 1984).

Nineteenth century did not produce any journal in India exclusively devoted to biology. However, in botany and zoology both, journals appeared either exclusively devoted to the subject or to its sub-disciplines. The journals on botany that appeared in the nineteenth century are *Annals of the Royal Botanic Garden* (f. 1887), *Records of the Botanical Survey of India* (f. 1893), and *Botanical Bulletin of the Department of Land Records and Agriculture – Punjab* (f. 1896). Several journals appeared in zoology also. The first two among them are popular zoology periodicals in Bengali, i.e. *Pasvavali* (f. 1822), and *Pakshir Vivaran* (f. 1844) devoted respectively to animals, and birds. Others are: *Stray Feathers* (f. 1873), and *Notes on Economic Entomology* (f. 1888). Both these were research periodicals but did not last long [6].

In the twentieth century dozens of Indian periodicals devoted to biosciences have started. Sen and Lakshmi listed these periodicals in their paper ‘Indian periodicals in *Science Citation Index*’ [7]

Journal of Biosciences, the base of our study, is not a very old journal inasmuch as it started only in 1979 and so far has produced 24 volumes. However, the journal in no time has attracted the attention of international scientific community and started getting covered by international abstracting and indexing services. *Science Citation Index* has been covering it without any break since 1982. The bibliometric indicators of the journal are as follows: Impact factor 0.37; Immediacy index 0.085; and Cited half life 5.9 years. All these factors are responsible for the selection of the journal for the study.

OBJECTIVES

The objectives of the study are to find out :

- Authorship pattern of cited references
- Distribution pattern of cited references according to documentary form
- Percentage of Indian cited references
- Author affiliation of citing articles.
- Percentage of author self citation
- Percentage of journal self citation

SCOPE

This study covers 34 research articles included in issue nos. 2 to 4 of volume 24 of *Journal of Biosciences* published in the year 2000. Citations appended to these articles number 1049 which form the base of the study. Unlike *Indian Journal of Medical Research*, this journal allows any number of citations to be included in the References Section of the article. As such, on average, an article has 30.85 references.

METHODOLOGY

The data was culled manually from the journal articles employing systematic sampling method. For each cited reference, the following data was recorded : (i) number of author(s), (ii) type of document, (iii) origin of the document/ journal, (iv) whether author self citation, and (v) whether journal self citation.

RESULTS AND ANALYSIS

Authorship pattern of cited references

Unlike *Indian Journal of Medical Research* which does not allow more than six authors in the author field of cited references, *Journal of Biosciences* allows all the authors' name to be included in the author field of cited references. This is decidedly a wise decision inasmuch as it allows the study of mega-authorship, i.e. authorship comprising ten or more authors, an emerging authorship trend especially in the field of biosciences. We have found in this study 25 cases of mega-authorship and one cited reference has 22 authors. The distribution of authorship is given in Table 1.

Table 1: Authorship pattern of cited references

Number of authors	Number of citations	Percentage	Rank
Single	196	18.68	3
Two	333	31.74	1
Three	220	20.97	2
Four	107	10.2	4
Five	82	7.82	5
Six	45	4.29	6
Seven	18	1.72	8
Eight	18	1.72	8
Nine	5	0.48	10
More than nine	25	2.38	7
Total	1049	100.00	

Table 1 shows that single-authored papers amount to 18.68 percent which is quite analogous to the percentage of single-authored papers found in the fields of chemistry and medicine. Two- and three-authored papers account for 52.71 per cent signifying that two- and three-author teams are in the majority in this particular field. Papers contributed by four or more authors account for 28.61 percent, which is also quite substantial. What is most interesting is the fact that mega-authorship accounts for 2.38 per cent of the papers, and one of the publications was by 22 authors.

Distribution of cited references according to type of publications

The citations under study comprised various documentary forms such as journal articles, monographs, handbooks, manuals, conference proceedings, encyclopaedias, PhD dissertations, etc. Journal articles tops the list with 85.89 per cent citations to its credit. As in the case of physics, chemistry, and medicine [1-3] the monographs rank second with a tally of slightly more than 10 per cent. In this study we did not encounter any references pertaining to electronic journals or Internet sites. The distribution of publications as per their documentary forms and rank is given in Table 2.

Table 2: Distribution of cited references according to type of publications

Type	Number of citations	Percentage	Rank
Journal articles	901	85.89	1
Monographs	106	10.1	2
Manuals	9	0.85	3
PhD theses	8	0.76	4
Others	25	2.38	

Percentage of Indian Citations

Out of 1049 cited references, only 58 (5.53%) are Indian. Compared to medicine where Indian citations account for 14.85 per cent [8], this percentage is quite low. Most of the Indian citations are articles published in journals. Table 3 shows the distribution of publications as per their origin.

Table 3 : Percentage of Indian citations vis-à-vis foreign citations

Type	Number of Indian citations	Number of Foreign Citations
Journal articles	41 (3.91%)	860 (81.98%)
Monographs	10 (0.95%)	96 (9.15%)
Manuals	0 (0%)	9 (0.85%)
PhD theses	5 (0.48%)	3 (0.29%)
Others	2 (0.19%)	23 (2.19%)

Citing Articles

The authorships of citing articles are found to be of three types: (i) Indian, (ii) foreign, and (iii) mixed. In this study, out of 34 research papers, 30 are by Indian authors (88.24%), 3 (8.82%) by foreign authors, and 1 (2.94%) jointly by Indian and foreign authors. This shows that *Journal of Biosciences* mostly publishes research papers by Indian authors. Why the journal is failing to attract more foreign papers is not known. Maybe the circulation, popularity, and prestige of the journal in international circle is quite low compared to the high impact journals of the field.

Author self citation

In this study we found 114 author self citations (ASC) amounting to 10.87% of total cited references. On average an article has 3.35 author self citations. The percentage of ASC in this case can be termed as a balanced one.

Journal self citation

If an article cites any article of the host journal then it is termed as a case of journal self citation (JSC). For example, if any article of *Journal of Biosciences* cites another article from this journal, then it will be a case of journal self citation. In this study we found only 6 journal self citations amounting to only 0.57% of total cited references. The percentage by any standard is too low. The JSC is a measure of the respect a journal commands in its own field and also indicates whether or not it publishes articles belonging to the high profile areas of research. The abysmally low JSC percentage of the journal possibly indicates that the journal commands little respect in its own field and fails to attract articles pertaining to the high profile areas of research.

CONCLUSION

Journal of Biosciences is possibly the topmost among Indian journals on the subject. Compared to other Indian journals its impact factor i.e. 0.370 is pretty good. For example, the impact factor of *Indian Journal of Medical Research* for the same year 1999 is 0.365. Inclusion of articles belonging to high profile areas of research by both Indian and foreigners is likely to improve the impact factor as well as the visibility of the journal a lot. Launching an Internet site helps a lot in enhancing the visibility as well as the impact factor of a journal.

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